REMARKS

Claims 1-22 are pending in the application, of which new claims 23 - 28 are newly presented. No new matter has been added.

Claim Rejections under 35 USC §103

Claims 1-3, 7, 9, 16-17 and 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue (Inoue et al., JP 2001-230407), in view of applicant's admitted prior art ("AAPA"), Sheppard (Sheppard et al., US 6,316,793) and/or Dawson (Dawson et al. (US 6,399,493).

At the outset it should be noted that a certified translation of priority document JP 2003-017308 is attached to this amendment. With the filing of this certified translation this establishes the effective filing date of this application as January 27, 2003.

Inoue discloses a GaN HEMT device comprising a SiC substrate, a GaN channel layer, an n-type AiGaN electron supply layer, source drain electrodes on the electron supply layer, a GaN cap layer, and a gate electrode on the GaN cap layer. It is to be noted that "the cap layer is formed between the source electrode 106 and the drain electrode 108" (ABSTRACT, SOLUTION). Therefore, there is no cap layer under the source and drain electrodes. The Examiner admits that Inoue fails to disclose that the bottom surfaces of the recesses are roughened compared to the top surface of the cap layer and that the cap layer is doped to n-type.

Although the Examiner states "the cap layer can be also be (sic) desiably –type doped for providing more electrons to the channel region", the GaN cap layer has a narrower band gap than the

n-type AlGaN electron supply layer and hence the n-type AlGaN electron supply layer forms a potential barrier to the electrons in the cap layer and source/drain resistance will increase (see page 8, lines 20-22). The n-type GaN cap layer serves to enhance the breakdown voltage of the GaN HEMT (see page 3, line 24 to page 4, line 3).

The Examiner refers to Fig. 8C of the instant application as AAPA. In Fig. 8C, the cap layer is not recessed, nor etched off at the source/drain contact regions as in Inoue.

The Examiner states "it is always desirable to form silicided contact to the source/drain region, as evidenced in Sheppard", and "such silicided contact can be better formed by roughening the source/drain contact surfaces, as evidenced in Dawson". Dawson discloses a silicon device. The silicon surface in the source/drain regions is etched to form oblique surfaces, and a silicide-forming material is deposited on the etched silicon surface. The silicon surface is heated so that the silicide-forming material and the silicon surface react with each other to form silicide. In the reaction, silicon moves into the silicide-forming material, and the silicide-forming material moves into silicon. The increased surface area enhances the surface reaction. Silicided electrode is very common in silicon devices, since silicon device has silicon surface. This is not the case in compound semiconductor device. Sheppard discloses a GaN HEMT device on a SIC substrate, similar to the instant invention. The source/drain electrode may be an alloy of nickel, silicon, and titanium, which may be called a silicide, and is formed on the underlying surface of AlGaN electron supply layer. There occurs no silicidation reaction between the semiconductor surface and the deposited metal. Even when the source/drain electrode of Sheppard is considered as a silicided

electrode, it is not analogous to the silicided electrode of Dawson. Since the respective layers of nickel, silicon and titanium are deposited and annealed to form alloy, the substrate surface would have no role in forming silicide. The applicant asserts that Ti/Si/Ni diffuses into AlGaN, and the AlGaN-Ti/Si/Ni mixed region functions to establish ohmic contact.

Therefore, there is no plausible reason to combine the silicon technology with the compound semiconductor technology. The applicant cannot find any reason to combine Dawson with Sheppard. There is no teaching in Inoue, FIG 8C of the instant application, and Sheppard to select the roughness of the bottom surface of the recess larger than the roughness of the top surface of the cap layer, and to provide recessed in the n-type cap layer (claim 16).

Therefore, the rejection of claims 1-3, 7, 9, 16-17 and 20 is respectfully traversed. Further, withdrawal of the rejection of claims 1-3, 7, 9, 16-17 and 20 under 35 U.S.C. 103(a) as being unpatentable over Inoue (Inoue et al., JP 2001-230407), in view of applicant's admitted prior art ("AAPA"), Sheppard (Sheppard et al., US 6,316,793) and/or Dawson (Dawson et al. (US 6,399,493) is respectfully requested.

New Claims

New claims 23-28 have been added to the application. No new matter is contained in these claims. Claim 23 finds support on page 9, lines 8-9 of the specification. Claims 24-26 find support on page 9, lines 11-15 of the specification. Claim 27 finds support in Figures 1A-1D and page 10, lines 15-17 of the specification. Claim 28 finds support in Figures 1A-1D and page 10, lines 15-22

of the specification. These new claims are allowable by virtue of their dependence from allowable independent claims. Therefore, allowance of new claims 23-28 is respectfully requested.

Conclusion

In view of the aforementioned amendments and accompanying remarks, claims 1-28, as amended, are believed to be in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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